REMARKS

Amendments

Claims 1, 6, 11, 16, and 17 have been amended to recite that the PTC resistive element comprises a conductive polymer composition. Basis for these amendments is found in paragraph [0018]. These amendments have been made in the interest of rapid prosecution and without prejudice to Applicant's right to prosecute claims of similar or different scope to the unamended claims in one or more continuation applications.

The Rejection Under 35 USC § 103(a)

Applicants respectfully traverse the rejection of claims 1, 2, 5, 11, 17, and 18 under 35 USC § 103(a) as unpatentable over Wartenberg et al. (U.S. Patent No. 5,747,147) in view of Nagahori (U.S. Patent No. 4,769,901), insofar as the rejection is applicable to the amended claims.

The present claims are directed to a surface mount circuit protection device in which a laminar PTC resistive element comprising a conductive polymer composition. The resistive element has a first electrode layer attached to a first surface; the first electrode layer being formed of a first metal material of a type adapted to be soldered to a printed circuit substrate. A second electrode layer is formed at a second major surface of the resistive element. Formed separately of the second electrode is a metal weld plate that has a thermal mass and thickness capable of withstanding resistance micro spot welding of a strap interconnect without significant resultant damage to the device. The ability to withstand damage is important, particularly when the PTC resistive element comprises a conductive polymer composition that would experience thermal damage as a result of the high temperatures associated with welding. The claimed device therefore can be soldered using one surface (i.e. the first electrode layer) and welded using the other surface (i.e. the metal weld plate on the second electrode layer). In a preferred use, the device is surface mounted to a printed circuit board assembly forming a battery protection circuit connected to a battery or battery cell by battery strap interconnects, wherein one of the battery strap interconnects is micro spot welded to the weld plate of the device.

Wartenberg et al. discloses a circuit protection device in which a conductive polymer is positioned between two metal foil electrodes. Wartenberg discloses that metal leads or thermal control elements, e.g. metal terminals, can be attached either directly or by means of an

intermediate layer, e.g. solder or conductive adhesive, to the foil electrodes. There is in Wartenberg no teaching or suggestion that a surface mount circuit protection device should or could have a first electrode layer that is solderable to a printed circuit board and a second electrode layer attached to a weld plate that is capable of withstanding resistance micro spot welding of a strap interconnect means without significant resultant damage to the device. Wartenberg merely teaches that metal leads or thermal control elements can be used. In fact, the detailed description of Examples 1 to 7 discloses attachment of tin-coated copper leads to each metal foil by means of solder (column 6, lines 49-53). There is no teaching of the use of Wartenberg's devices to achieve both solderability to a circuit board and weldability to a strap interconnect.

Although the Examiner contends that Column 5, lines 48-52 of Wartenberg teaches the presence of a metal material "having a volume, thickness and thermal mass capable of withstanding electromechanical interconnect [Col., [sic] 46-48] means without significant resultant damage to the device [Col. 6, lines 13-19, Figure]", as Applicants have previously argued, there is, in fact, no teaching or disclosure whatsoever of the use of resistance micro spot welding in Wartenberg and no disclosure that any damage can occur, still less how to avoid such damage.

The deficiencies of Wartenberg are not resolved by the addition of Nagahori. Nagahori discloses the use of spot welding to attach a lead plate to an electrode that is positioned on a PTC composition. A key feature of Nagahori is that the spot welding process forms at least one through hole that penetrates through the electrode and the lead plate to contact the PTC. While Nagahori discloses that heat damage during the welding of the electrode plates and lead plates is alleviated and the contact resistance is decreased, one reading Nagahori would be taught that the welding process was such that sufficiently intense heat was generated to create a hole through the metal plates. This certainly would be the opposite of the teaching of Applicants' claims, i.e. that no damage to the PTC resistive element would occur when making a device capable of being surface mounted by soldering on one surface and welding on the other surface.

Applicants respectfully traverse the rejection of claims 3, 4, 12-15 and 18-20 under 35 USC § 103(a) as unpatentable over Wartenberg et al. (U.S. Patent No. 5,747,147) in view of Nagahori (U.S. Patent No. 4,769,901) and further in view of Banich et al. (U.S. Patent No. 6,104,587), insofar as the rejection is applicable to the amended claims.

The deficiencies of Wartenberg and Nagahori noted above are not resolved by the addition of Banich et al. Banich discloses an electrical device in which a PTC resistive element composed of a conductive polymer composition is sandwiched between two metal foil electrodes, at least one of which has a thickness of at least 0.055 mm. The ratio of the thickness of the resistive element to the electrode thickness is 1:1 to 16:1. Like Wartenberg and Nagahori, Banich does not disclose a device in which there is a first electrode layer that is solderable to a printed circuit board and a second electrode layer attached to a weld plate that is capable of withstanding resistance micro spot welding.

Banich is cited by the Examiner as disclosing the weld plate comprises nickel and the Examiner identifies element 75 as the weld plate. In fact, element 75 is the base layer of one of the electrodes (second electrode 7); see column 6, lines 46-55. It is an integral part of the electrode and is not separate from the electrode as would be required for the weld plate. As set forth in column 7, lines 20-29, the electrodes used in Examples 2 and 3 of Banich (which conform to the devices shown in Figure 2 with element 75) use a foil of the type disclosed in U.S. Application No. 08/816,471, having a base layer of a first metal, a surface layer of a second metal, e.g. nickel, and an intermediate layer that is different from the first metal (see column 5, lines 19-38). Thus element 75 is not, in fact, a weld plate or the equivalent of a weld plate. Thus, even if Banich is combined with Wartenberg and Nagahori, the present claims are not the result.

Disclosure Under 37 CFR § 1.56

In fulfilling the duty of candor and good faith, the following documents are hereby disclosed to the Patent Office in accordance with 37 CFR § 1.56. It is not admitted that the information in the listed documents is material to patentability as defined in 37 CFR § 1.56(b). The Examiner is requested to consider the documents in the examination of this application.

Accompanying this statement is a Form PTO/SB/08A in duplicate on which the documents are listed, except as indicated. The Examiner is requested to return an initialed and signed copy of the form once the documents have been considered.

The following documents were submitted by a third party to the Japanese Patent Office in connection with the examination of Japanese Application No. 2005-071231, which is a counterpart of the present application. Each of the documents is listed on the attached Form

PTO/SB/08A except for International Publication No. WO 99/60637, which was listed in the Disclosure Statement for this application dated July 16, 2007.

FOREIGN PATENT DOCUMENTS

Document Number	Publication Date	Name of Patentee or Applicant	Translation
JP-5-21207-A	01-29-1993	Daito Communication Apparatus Co. Ltd. (Sugaya)	Counterpart[1]
JP-10-510683-A	10-13-1998	Bourns Multifuse (Hong Kong) Ltd. (Hogge et al.)	Counterpart[2]
JP-2002-110403-A	04-12-2002	TKD Corp. (Kobayashi et al.)	Abstract
JP-2003-168407-A	06-13-2003	Tokyo Shibaura Electric Co. (Yasui et al.)	Abstract
WO-99/60637-A	11-25-1999	Raychem KK (Sato et al.)	Counterpart[3]

[1] Counterpart of European Publication No. 0 522 863 A1, published January 13, 1993.

[2] Counterpart of International Publication No. WO97/06660, published February 27, 1997.

[3] Counterpart of European Publication No. 1 102 338 A1, published May 23, 2001 and U.S. Patent No. 6,713,210, issued March 30, 2004).

Copies of Documents

In accordance with 37 CFR §1.98(a)(2), copies of the foreign patents and foreign patent publications listed above are enclosed.

Fee

In accordance with 37 CFR § 1.97(c)(2), the Commissioner is authorized to charge the fee for submitting this Information Disclosure Statement ($180) to Deposit Account No. 18-0560.

Conclusion

It is believed that this application is now in condition for allowance and such action at an early date is earnestly requested. If, however, there are any outstanding issues which can be usefully discussed by telephone, the Examiner is asked to call the undersigned.

Respectfully submitted,

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